

**In the Drawings:**

Please amend Figure 6 by replacing numeral 618 with numeral 616.

### **REMARKS**

The presently pending claims have been amended to increase clarity without changing the essential scope of the claimed invention. Support for the amendments can be found generally at paragraphs [0121] through [0126] (which correspond to the material at pages 19-22).

The drawings and particularly Figure 6 were objected to because the Validation step was incorrectly identified with numeral 618. Numeral 618 has been replaced with numeral 616 in the accompanying Replacement Sheet. The Abstract was objected to because of an obvious typographical error, which has now been corrected. Several claims were objected to because of informalities. These informalities have been addressed with the above amendments. Withdrawal of the above objections is requested.

Claims 73, 74, 81, 82, 989, and 90 were rejected under 35 USC 112 second paragraph as being indefinite due to the use of the phrase “the further predetermined relationship”. The current claims do not use that phrase and thus the rejection is no longer warranted. Notification to that effect is requested.

Claims 85-92 were rejected under 35 USC 112 and 35 USC 101. These claims have been amended to recite a computer-readable medium having thereon a computer code. Accordingly, these claims are now definite and recite patentable subject matter. The rejections are no longer warranted and notification to that effect is requested.

Claims 69, 70, 72- 74, 77, 78, 80-82, 85-86, 88-90 were rejected as being anticipated by Hochbaum. The remaining claims were rejected as being obvious in view of Hochbaum and Gershon or Jain. Applicants respectfully traverse.

Hochbaum fails to teach or describe the steps of processing the blocks of the block model based on at least one criteria to define a plurality of clusters each comprising a plurality of blocks and defining clumps of material from the intersection of the cones, the clumps comprising volumes of material not crossed by precedence arcs.

Hochbaum describes a study that compared the performance of a prior art algorithm, the Lerchs and Grossman algorithm (“the LG algorithm”), with a maximum flow “push-relabel” algorithm (See Abstract). In the first section of Hochbaum paper, she describes the use of the LG algorithm, which is an algorithm applied to a block model with the aim to optimize the yield of a pit. The second section of the paper relates to a technique she uses to obtain or create a block model of a pit in the absence of any real data (see Section 4 “Data Generation”). It is from this latter section that the Examiner points to as a teaching of a “cluster”. Hochbaum’s reference to a “cluster” differs from that of the present claims. In Hochbaum, clusters are simulated ore deposits located within the block model in a random fashion in order to simulate a block model (see 4.1 “We generate them [clusters] so they resemble real ore clusters. ... we provide here only a sketchy qualitative description of the ore clusters generation”). Put another way, in Hochbaum the term “cluster” relates to simulating data. Accordingly, in Hochbaum, the clusters are generated by a random generation process so that blocks will be bunched to reflect the

reality of how ore deposits form within a larger mineral deposit. It is the blocks-not the clusters-to which the algorithms of LG and Hochbaum are applied. In contrast, in the method and apparatus of the present invention, a cluster relates to processing blocks from a block model where the blocks are grouped by a process in accordance with at least one criteria. Thereafter, the method of the present invention operates on the cluster-not the blocks. Because Hochbaum does not teach or suggest this feature of the claims, Hochbaum cannot anticipate or render obvious the claims.

The Action also asserts that Hochbaum discloses “defining clumps of material by the intersection of the cones so that material is extractable from the mine in a desired clump order to provide flexibility n the extraction of the material from the mine”. The Action points to section 1, para. 1, lines 8-12 and section 3.2 for support for the assertion. Section 1, para. 1, lines 8-12 recites:

Each block has a weight associated with it representing the value of its ore less the cost of excavating the block. There are constraints that specify the slope requirements of the pit and precedence constraints preventing block from being mined before others on top of them. Subject to these constraints, the objective is to mine the set of blocks which provide the maximum net benefits.

There is, however, nothing in this passage that remotely describes or suggests defining clumps of material. Moreover, there is nothing in this passage that describes or suggests that the clumps are defined from the intersection of the cones and further that the clumps comprise volumes of material not crossed by precedence arcs so that material is extractable from the mine in any extraction ordering of the clumps that is feasible according to the precedence arcs.

The presently claimed invention involves taking the block model and applying at least one criteria to form clusters. Precedent arcs are then propagated from these clusters and their intersections define volumes of material, i.e., clumps. These clumps of material are much larger than individual blocks. Accordingly, the clumps define feasible mineable volumes of material that have the advantage that if they are extracted in an order where the precedent arcs are obeyed, the blocks themselves can be removed because the manner in which the clumps and clusters are defined ensures that precedence rules are obeyed for the individual blocks. As a result, a more manageable size of material to be worked is achieved, while enabling feasible mine design and retaining flexibility. Accordingly, because Hochbaum does not teach or describe each limitation required by the claim, Hochbaum cannot and does not anticipate the claims. Withdrawal of the rejection is requested.

As for the proposed combination of Hochbaum and either Gershon or Jain, the proposed combination still does not teach or suggest the present invention. Simply put, neither Gershon nor Jain cures the deficiencies of Hochbaum. Gershon describes a mine planning model using a block model in which cones are generated upward from each block to approximate the shape of the pit and to determine whether or not the block in question should be part of the ultimate pit (see p. 7). Gershon, however, does not describe or teach defining clusters according to at least one criteria, forming a cone for each cluster, or defining clumps of material from the intersection of the cones. Therefore, Gershon does

not cure the deficiencies of Hochbaum. As a result, the combination of Hochbaum and Gershon does not teach or suggest the present invention.

Similarly, while Jain describes clustering and manipulation of clusters, Jain does not describe or teach at least forming a cone for each cluster, or defining clumps of material from the intersection of the cones. Accordingly, a combination of Hochbaum and Jain still would not teach or suggest the present invention.

Because neither Hochbaum alone nor Hochbaum in combination with either of Gershon or Jain teach or suggest the presently claimed invention, the rejection of the claims should be withdrawn. Applicant believes that all the claims are allowable and notification to that effect is requested. If, for any reason, the Examiner needs to contact the undersigned attorney, I can be reached at (312) 321-4246.

Respectfully submitted,

/G. Peter Nichols/  
G. Peter Nichols  
Reg. No. 34,401  
Attorney for Applicants

BRINKS HOFER  
GILSON & LIONE  
P.O. Box 10395  
Chicago, IL 60610  
(312) 321-4200